

Appl.No.09/759,205  
Amdt. dated December 8, 2004  
Reply to Office action of March 15, 2004

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Canceled).
2. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, further comprising the steps of:
  - (e) evolving the patient to a subsequent health state responsive to the at least one intervention; and
  - (f) evaluating the user responsive to the at least one intervention input by the user.
3. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, further comprising the steps of:
  - (e) evolving the patient to a subsequent health state responsive to the at least one intervention and the patient history; and
  - (f) evaluating the user responsive to at least one of the at least one intervention input by the user, and the subsequent health state.

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4. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, further comprising the steps of:

- (e) evolving the patient to a subsequent health state responsive to the at least one intervention and the patient history;
- (f) receiving at least one other intervention input by the user;
- (g) evolving the patient responsive to the at least one other intervention to at least one other subsequent health state; and
- (h) evaluating the user responsive to at least one of the at least one other intervention, the at least one subsequent health state, and the at least one other subsequent health state.

5. (Previously Amended). A computer implemented simulation and evaluation method according to claim 4, wherein said evolving step (e) uses an entity relationship model.

6. (Original) A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model comprises population, record, agents of change, health states, findings and courses of action.

7. (Original). A computer implemented simulation and evaluation method according to claim 6, wherein the findings include specific findings, patterns and sub-patterns describing patient behaviors and characteristics.

8. (Original). A computer implemented simulation and evaluation method according to claim 7, wherein the patterns describe one or more features over time.

9. (Original). A computer implemented simulation and evaluation method according to claim 7, wherein the sub-patterns describe consequences of patient related events.

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10. (Original). A computer implemented simulation and evaluation method according to claim 7, wherein the patterns model time and characterize interrelated medical observations.

11. (Original). A computer implemented simulation and evaluation method according to claim 7, further comprising the step of performing a differential diagnosis responsive to the findings, the patterns and the sub-patterns.

12. (Original). A computer implemented simulation and evaluation method according to claim 7, wherein confidence in a presence of the patterns increases with passage of time.

13. (Previously Amended). A computer implemented simulation and evaluation method according to claim 6, wherein the courses of action describe tasks and methods used to apply, modify, and evaluate health state information and characteristics described in the entity relationship model.

14. (Original). A computer implemented simulation and evaluation method according to claim 6, wherein the courses of action describe patient activities, including at least one of medical and non-medical activities.

15. (Original). A computer implemented simulation and evaluation method according to claim 6, wherein the courses of action describe potential interventions input by the user including at least one of diagnostic and management strategies.

16. (Previously Amended). A computer implemented simulation and evaluation method according to claim 6, wherein the courses of action comprise one or more elementary courses of action used to construct at least one course of action, one or more types of elementary courses of action corresponding to the one or more elementary course of action, and weighting factors corresponding to the one or more elementary courses of action.

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17. (Original). A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model includes entity relations.

18. (Previously Amended). A computer implemented simulation and evaluation method according to claim 17, further comprising the step of evolving the patient responsive to the at least one intervention, the entity relations and the patient history to at least one subsequent health state.

19. (Previously Amended). A computer implemented simulation and evaluation method according to claim 5, wherein the at least one intervention by the user is considered by the entity relationship model in evolving the patient from a first health state to a subsequent health state.

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20. (Original). A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model includes one or more of the following relations between entities:

Population Contacts Population  
Population Related to Population  
Population Interacts with Courses of Action  
Population Exposed to Agents of Change  
Population Has Health States  
Population Exhibits Findings  
Agents of Change Cause Health States  
Health States Lead to Health States  
Findings Associated with Health States  
Findings Link to Findings  
Course of Action use Agents of Change  
Courses of Action Identify Agents of Change  
Courses of Action Treat Health States  
Courses of Action Alter Findings  
Courses of Action Reveal Findings  
Courses of Action Evaluation Findings.

21. (Original). A computer implemented simulation and evaluation method according to claim 6, wherein the entity relationship model links the findings with the patterns to a health state, rather than linking a range of finding values to the health state.

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22. (Original). A computer implemented simulation and evaluation method according to claim 6, wherein the patterns include sensitivity and specificity represented as age dependent, rather than as constants.

23. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, wherein said generating patient history step (c) is executed once for each simulation to generate the patient history used in said computer implemented simulation and evaluation method.

24. (Previously Amended). A computer implemented simulation and evaluation method according to claim 2, further comprising the step of repeating said evolving step (e), and said evaluating step (f) a plurality of times.

25. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, wherein said generating step (c) generates the patient history comprising a progression of health states and risk factors traversed by the patient from a normal health condition to a specified health condition.

26. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, wherein said generating step (c) iteratively generates the patient history backwards in time from a specified health condition to a normal health condition including successive precursor health states and onset times therebetween.

27. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, wherein said generating step (c) generates the patient history using a Monte Carlo process to generate a plurality of potential patient histories.

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28. (Original). A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model utilizes tree structures to describe a probability density function conditioned on comorbidities, treatments, risk factors, and the interventions.

29. (Original). A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model includes diagnostic complexities and disease interaction.

30. (Previously Amended). A computer implemented simulation and evaluation method according to claim 40, wherein parallel networks of health states are used to model transactions that occur among a set of health conditions responsive to the at least one intervention by the user.

31. (Original). A computer implemented simulation and evaluation method according to claim 30, wherein the parallel networks of health states describe at least one of a chronic condition and non-chronic condition.

32. (Previously Amended). A computer implemented simulation and evaluation method according to claim 31, wherein the non-chronic condition includes acute exacerbations describing acute flares of illness that occur during a more chronic health condition.

33. (Previously Amended). A computer implemented simulation and evaluation method according to claim 30, wherein the parallel networks of health states form at least one of the following interactions:

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- (1) independent interaction between parallel networks so that patient evolution between first and second parallel networks are unrelated to each other;
- (2) unilateral interaction between the parallel networks so that patient evolution on a first parallel network is unrelated to patient evolution on a second parallel network, and patient evolution on the second parallel network is related to the patient evolution on the first parallel network; and
- (3) mutually dependent interaction between the parallel networks so that patient evolution between the first and second parallel networks are related to each other.

34. (Previously Amended). A computer implemented simulation and evaluation method according to claim 2, further comprising the step of repeating said evolving step (e) responsive to:

- (1) parallel health states of the patient; and
- (2) a target health state and health state combinations that lead to different parallel states.

35. (Original). A computer implemented simulation and evaluation method according to claim 30, wherein the parallel networks of health states comprise:

- (1) a primary network including primary health conditions defining a health domain;
- (2) a risk factor network including risk factors for progression through the primary network; and
- (3) complications attributed to treating the primary health conditions in the primary network.



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36. (Original). A computer implemented simulation and evaluation method according to claim 35, wherein the parallel networks of health states are generated using the following information:

- (1) how long at least one of the risk factors exists before influencing a transition between primary health conditions in the primary network;
- (2) time required for transitions in the primary network, considering different combinations of the risk factors; and
- (3) number of transitions the patient is allowed to make between a specified health state and a normal health state.

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37. (Previously Amended). A computer simulation and evaluation system for simulating interventions to a patient having a health state, by a user, and for evaluating the interventions, comprising:

a knowledge database storing a plurality of health characteristics including at least one of population, record, agents of change, health states, findings and courses of action;  
a presentation system providing access to the computer simulation and evaluation system by the user; and

a patient simulation system adapted to be connectable to said presentation system and said knowledge database, said patient simulation system performing the functions:

- (a) accessing a profile of said user;
- (b) defining a test area in response to said profile and selecting genetic information of the patient responsive to the test area and the knowledge database;
- (c) dynamically generating a patient history, from the database, that is tailored to the user profile, comprising a patient age, gender, and age of onset of medical condition, wherein the medical condition is one of a plurality of medical conditions available within the knowledge database;
- (d) receiving at least one intervention input by the user; and
- (e) evaluating the user responsive to the at least one intervention input by the user and the predetermined criteria.

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38. (Previously Amended). A computer readable tangible medium storing instructions for implementing a process driven by a computer, the process simulating interventions initiated by a user, the interventions including active and passive interventions to a patient having a health state, and the process evaluating the interventions responsive to predetermined criteria and the interventions, the instructions comprising the steps of:

- (a) accessing the computer implemented simulation and evaluation method by the user;
- (b) accessing a profile for said user;
- (c) defining a test area to evaluate the user by the computer implemented simulation and evaluation method responsive to a user profile;
- (d) selecting genetic information of the patient responsive to the test area;
- (e) dynamically generating a patient history responsive to the test area, comprising a patient age, gender, and age of onset of medical condition, extending back in time to a state of normal patient health, wherein the medical condition is one of a plurality of potential medical conditions;
- (f) receiving at least one intervention input by the user; and
- (g) evaluating the user responsive to the at least one intervention input.

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39. (Currently Amended). A computer implemented simulation and evaluation method simulates interventions to a patient by a user, and evaluates the interventions responsive to predetermined criteria and the intervention, said method comprising the steps of:

- accessing a profile for said user,
- defining a test area to evaluate the user responsive to at least ~~one of predetermined criteria~~ and the user profile for said user,
- selecting genetic information of the patient responsive to the test area,
- dynamically generating a patient history responsive to the test area, comprising a patient age, gender, and age of onset of medical condition, extending back in time to a state of normal patient health, wherein the medical condition is one of a plurality of potential medical conditions,
- receiving at least one intervention input by the user, and
- evaluating the user responsive to the at least one intervention.

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40. (Currently Amended). A computer implemented simulation and evaluation method for testing a user's problem solving abilities in response to a complex system, said method comprising the steps of:

- (a) accessing a profile for said user;
- (b) selecting a testing area to evaluate said user based on at least the user's profile;
- (c) dynamically generating a patient history, responsive to said testing area, comprising a patient age, gender, and age of onset of medical condition, extending back in time to a state of normal patient health, wherein the medical condition is one of a plurality of medical conditions; and
- (d) receiving at least one intervention input by the user, and evaluating said user responsive to said at least one intervention.

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41. (Currently Amended). A computer implemented simulation and evaluation method for testing a user's medical problem solving abilities in response to a complex system, said method comprising the steps of:

- (a) accessing a profile for said user;
- (b) selecting a testing area to evaluate said user based on at least the user's profile;
- ~~(a)~~ (c) dynamically generating a patient history responsive to said testing area comprising a patient age, gender, and age of onset of medical condition, extending back in time to a state of normal patient health, wherein the medical condition is one of a plurality of potential medical conditions;
- ~~(b)~~ (d) receiving at least one intervention input by said user, wherein said at least one intervention includes passive and active interventions;
- ~~(c)~~ (e) evolving the an initial patient history state to a subsequent patient history health state responsive to said at least one intervention; and
- ~~(d)~~ (f) evaluating said user responsive to said at least one intervention.

42. (Previously Amended). The method according to claim 41, wherein evolving the initial patient history state to said subsequent patient history state occurs over a finite stochastically determined time period.

43. (Original). The method according to claim 41, further comprising the step of repeating said evolving step and receiving step a plurality of times.

44. (Canceled).

45. (Canceled).

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46. (Currently Amended). A computer implemented simulation and evaluation method for testing a user's medical skills, comprising the steps of:

- (a) accessing a profile for said user;
- (b) selecting a testing area to evaluate said user based on at least the user's profile;
- ~~(a)~~ (c) dynamically generating multiple instances of patients responsive to said testing area, wherein each instance of a patient has an initial patient history state comprising a set of health states, and a patient age, gender, and age of onset of medical condition, wherein the medical condition is one of a plurality of potential medical conditions;
- ~~(b)~~ (d) evolving at least one of each instance of said patient's initial patient history state to a-subsequent patient health state;
- ~~(e)~~ (e) receiving at least one intervention input by said user, wherein said at least one intervention includes passive and active interventions; and
- ~~(d)~~ (f) evaluating said user, responsive to said at least one intervention.

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47. (Currently Amended). A computer implemented method for evaluating a user's response to a simulated patient, said method comprising:

accessing a profile for said user;

selecting subject matter on which to evaluate a user, wherein said subject matter is determined by said profile;

dynamically generating a medical history for said patient responsive to said subject matter, wherein generating said medical history comprises iterating from a current medical condition backward in time through at least one precursor health state to a normal health state, wherein the medical condition is one of a plurality of potential medical conditions;

receiving from the user at least one query pertaining to at least one of the current medical condition and the medical history;

evolving the current medical condition forward in time in response to the at least one input; and

evaluating said user based on at least one input from the user.



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48. (Previously Amended). A computer implemented method for evaluating a user's response to a simulated patient, said method comprising the steps of:

- accessing a user profile;
- selecting subject matter on which to evaluate said user, wherein said subject matter is determined by said user profile;
- generating a first target health state of a simulated patient, wherein said first target health state is determined by said user profile;
- dynamically generating, responsive to said user profile, a medical history for said simulated patient;
- presenting said simulated patient to said user;
- receiving at least one query including at least one of an intervention and a request for additional information regarding the patient from said user in response to said first target health state;
- evolving said first target health state forward in time, in response to said at least one query to a second target health state; and
- evaluating said user based on said at least one query.

49 – 51. (Canceled).

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52. (Currently Amended). A computer simulated method for evaluating the problem solving skills of a user, said method comprising:

accessing a profile for said user;

selecting subject matter on which to evaluate said user from a plurality of subject matter,

wherein said subject matter is determined by at least said profile;

dynamically generating a first problem environment, wherein said first problem

environment is determined by said subject matter;

dynamically generating a history of said first problem environment, wherein generating

said history comprises iterating from said first problem environment backward in time

through at least one precursor situation to an initial situation;

receiving at least one query including at least one of an intervention and a request for

additional information from said user in response to at least one of said first problem

environment and the history;

receiving medical advice from the user;

evolving said first problem environment forward in time in response to the medical advice;

and

evaluating said user based on the medical advice.

53. (Previously Presented). A computer implemented simulation and evaluation method according to claim 5, wherein the entity relationship model uses first descriptors to represent entities, and second descriptors to illustrate how the entities interact.

54. (Previously Presented). The system according to claim 40, wherein the medical condition is represented as a vector listing a current health condition from a parallel network respectively associated with each of a plurality of body parts.

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55. (Previously Presented). The system according to claim 54, wherein each parallel network lists transitions that occur among a set of mutually exclusive health conditions occurring in each body part.

56. (Previously Presented). The system according to claim 54, wherein a transition from the current health condition to a next health condition occurs over a time interval as determined by a probability density functions conditioned on at least comorbidities, and a treatment comprising at least one intervention input that is provided between the current health condition and the next health condition.

57. (Previously Presented). The system according to claim 40, wherein at least one instance of the patient history is stored for respective use with at least a second user.

58. (Previously Presented). The method as recited in claim 40, further comprising the step of selecting epidemiological information including at least one of genetic information and environmental information of a patient responsive to said testing area.

59. (Previously Presented). The method as recited in claim 40, wherein the at least one health state comprises a plurality of health states, and the at least one intervention comprises a plurality of interventions.

60. (Previously Presented). The method according to claim 40, wherein the patient history is dynamically generated and the user is evaluated with respect to a multi-factoral problem.

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61. (Previously Presented). The method according to claim 40, wherein a plurality of parallel networks are used to implement a plurality of health states and transitions therebetween.

62. (Previously Presented). The method according to claim 61, wherein at least one of the transitions is responsive to a current vector and that at least one intervention associated therewith.

63. (Previously Presented). The method according to claim 62, wherein the current vector characterizes at least one parallel health state associated with at least one of the parallel networks.

64. (Previously Presented). The method according to claim 62, wherein the patient history comprises a unique patient history that is usable over a plurality of evaluations.

65. (Previously Presented). The method according to claim 64, wherein the unique patient history and medical knowledge associated therewith are reusable over a plurality of evaluations.

66. (Previously Presented). The method according to claim 40, wherein the patient history may be used for a plurality of users that are independently evaluated.